Removing ISFs and ESMs from Level 2 Status

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In 2003 and 2004 the Department held several meetings to revise the nondegradation rules regarding Level 2 treatment and invited all stakeholders to attend. Based on recommendations from the group of stakeholders that attended those meetings, the Department was able to promulgate new rules regarding the information necessary to classify an subsurface wastewater treatment systems (SWTS) as a Level 2 system (see ARM 17.30.718), and revise the definition of "Level 2" [ARM 17.30.702(11)][(1)]. The group also agreed to add two new categories of nitrogen reducing SWTSs to the rules, Level 1a and Level 1b [see definitions in ARM 17.30.702(9) and (10), respectively][(1)].

The Department has historically approved recirculating sand filters (RSF), intermittent sand filters (ISF), and elevated sand mounds (ESM) as Level 2 SWTSs. The historic Level 2 designations were, as best we can determine, based on professional opinion at the time, not on published or available data. The Department has recently reviewed published reports, journal articles and USEPA documents regarding nitrogen treatment capabilities of various SWTSs. From that research ISFs and ESMs cannot meet the requirements for Level 2 treatment, while RSFs can meet the Level 2 requirements.

The reclassification of ISFs and ESMs will not affect the status of existing or approved (but not yet constructed) ISFs or ESMs, nor will it effect ISFs or ESMs that are included in a subdivision or public wastewater system application that is submitted to the state before **May 1, 2005**. Any ISF or ESM submitted to the Department after that date will be reviewed under the revised classification as discussed below.

<u>Elevated Sand Mound (ESM)</u>

The following summary is based on the results from four studies (House, et al., 1994; Shaw and Turyk, 1994; Converse et al., 1994; Harkin et al., 1979). The average percent reduction of total nitrogen in the ESMs (after treatment in the septic tank and before treatment below the absorption trenches) was 5.5%. When the estimated nitrogen reduction in the septic tank (10%) and beneath the absorption trenches (7%) is added in (USEPA, 2002; Siegrist et al., 2000; Gold and Sims, 2000; Pell and Nyberg, 1989; Laak, 1981), the reduction of total nitrogen is approximately 22.5%. In addition, the average effluent total nitrogen concentration prior to treatment in the absorption trenches measured in the studies was 51.5 mg/L.

Based on the above information and the definitions for Level 1a, 1b and 2, ESMs do not meet the requirements for any of those categories of nitrogen reduction. Therefore, the Department will no longer consider ESMs as Level 2 treatment effective on **May 1, 2005**.

For purposes of evaluating the nitrogen impacts from ESMs and compliance with nondegradation requirements and water quality standards, the Department will use a nitrate (as N) effluent concentration of 50 mg/L in the nitrogen dilution calculations. The 50 mg/L effluent concentration is the same as is used for a conventional SWTS (septic tank and subsurface absorption trenches). Because ESMs will no longer be considered as Level 2 systems, the nitrate

concentration at the end of a ground water mixing zone for an ESM must be less than or equal to 5 mg/L.

Intermittent Sand Filter (ISF)
The following summary is based on the results from 17 studies (Dupuis et al., 2002; USEPA 2002; Penninger and Hoover, 1998; Pell and Nyberg, 1989; USEPA, 1985; Converse and Converse, 1998; Jones et al., 1998; Bushman, 1996; Weaver et al., 1998; Scherer and Mitchell, 1981; Cagle and Johnson, 1994; Sauer et. al., 1976; Effert et al., 1984; Ronayne et al., 1982; McCarthy et al., 1998; Loomis et al, 1998; Sievers, 1998). The average percent reduction of total nitrogen in the ISFs (after treatment in the septic tank and before treatment below the absorption trenches) was 30%. When the estimated nitrogen reduction in the septic tank (10%) and beneath the absorption trenches (7%) is added in (USEPA, 2002; Siegrist et al., 2000; Gold and Sims, 2000; Pell and Nyberg, 1989; Laak, 1981), the reduction of total nitrogen is approximately 47%. The average effluent total nitrogen concentration prior to treatment in the absorption trenches measured in the studies was 32.7 mg/L (after an additional estimated 7% treatment below the absorption trench the concentration discharged to ground water would be 30.4 mg/L).

Based on the above information and the definitions for Level 1a, 1b and 2, ISFs meet the requirements for Level 1b systems. Therefore, the Department will change the classification of ISFs from Level 2 to Level 1b effective on **May 1, 2005**.

For purposes of evaluating the nitrogen impacts from ISFs and compliance with nondegradation requirements and water quality standards, the Department will use a nitrate (as N) effluent concentration of 40 mg/L in the nitrogen dilution calculations [pursuant to ARM 17.30.702(10)(b)]. Because ISFs will no longer be considered as Level 2 systems, the nitrate concentration at the end of a ground water mixing zone for an ISF must be less than or equal to 5 mg/L.

Recirculating Sand Filters (RSF)
Based on published studies and discharge monitoring reports (DMRs), RSFs do meet the requirements for Level 2 treatment, their current classification as Level 2 systems will not change. The DMRs are submitted to the Department for RSF systems that require monitoring as part of their Montana Ground Water Pollution Control System permits.

Recirculating Trickling Filters (RTF)
Since the new rule, ARM 17.30.718, was promulgated in 2004, two types of RTFs have been approved as meeting Level 2 treatment requirements with some limitations. These are the Orenco AdvanTex and the Fluidyne Eliminite systems. The Department maintains an updated list of nutrient reducing SWTSs on its web-site, the web address is:

http://www.deq.mt.gov/wqinfo/Nondeg/Index.asp

If you have any questions you can contact Eric Regensburger at 406-444-0916; eregensburger@mt.gov; or DEQ, 1520 E. Sixth Ave., Helena, MT 59620.

Notes:

(1) The definitions from ARM 17.30.702 are given below:

(9) "Level 1a treatment" means a subsurface wastewater treatment system (SWTS) that:

(a) removes at least 50%, but less than 60%, of total nitrogen as measured from the raw sewage load to the system; or

(b) discharges a total nitrogen effluent concentration of greater than 24 mg/L, but not greater than 30 mg/L. The term does not include treatment systems for industrial waste. A level 1a designation allows the use of 30 mg/L nitrate (as N) as the nitrate effluent concentration for mixing zone calculations.

(10) "Level 1b treatment" means a SWTS that:

(a) removes at least 34%, but less than 50%, of total nitrogen as measured from the raw sewage load to the system; or

(b) discharges a total nitrogen effluent concentration of greater than 30 mg/L, but not greater than 40 mg/L. The term does not include treatment systems for industrial waste. A level 1b designation allows the use of 40 mg/L nitrate (as N) as the nitrate effluent concentration for mixing zone calculations.

(11) "Level 2 treatment" means a SWTS that:

(a) removes at least 60% of total nitrogen as measured from the raw sewage load to the system; or

(b) discharges a total nitrogen effluent concentration of 24 mg/L or less. The term does not include treatment systems for industrial waste.

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